





Sensory Integration in Young Children with Developmental Disabilities

Julia Wilbarger, Ph.D., OTR
 Dept. of Kinesiology
 Occupational Therapy Program
 University of Wisconsin, Madison




Sensory Integration

- "Sensory Integration is the neurological process that organizes sensation from one's own body and from the environment and makes it possible to use the body effectively within the environment....."



Ayres, 1972 (p. 11)

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Scope of Sensory Integration

- Theory of CNS function
- Theory of Development
- Treatment Approach

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Theory of CNS function

Sensory systems are not only our means for perceiving the external world, but are also essential to maintaining arousal, forming our body image and regulating movement.

J. Martin (1991) P.339
In Kandel, Jessel & Schwartz (Eds), *Principles of Neuroscience*

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Theory of Development

- Sensory inputs contributes to development
- Sensory input is necessary for brain function
- Active engagement in sensory experience produces an adaptive response
- Adaptive responses to sensory inputs optimize function

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Treatment Approach

- The demand for integration of sensation in the context of activities that demand an adaptive response can change function and organization
- Use enhanced sensation in intrinsically motivating activities

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Development of SI Theory

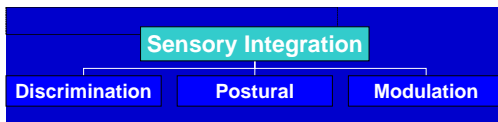
- Historical Context
 - Emergence of theories of subtle disorders of learning and behavior
 - Minimal Brain Dysfunction
 - Learning Disabilities
 - Perceptual Motor Deficits in Children
 - Hyperactivity
 - Understanding of the Brain
 - Factor Analytical Studies

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Ayres Original Factors

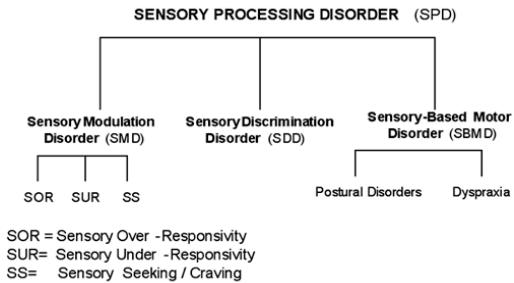
- Dyspraxia:
 - Poor somatosensory functions, Poor motor planning
- Poor Bilateral Integration:
 - Postural deficits/Vestibular & Proprioceptive functions
- Tactile Defensiveness:
 - Increased activity, distractibility
- Form & Space deficits
- Auditory-Language dysfunction

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Proposed New Taxonomy (Miller et al., 2004)



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Sensory Modulation

- Intake of sensation via typical processing mechanisms such that, the degree, intensity and nature of response is graded to match environmental demands, and a range of optimal performance or adaptation is maintained..
 - ☐ Sensory Defensiveness
 - ☐ Aversive Responses to Sensation
 - ☐ Under Responsiveness to Sensation
 - ☐ Sensory Seeking

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Sensory Discrimination

- The ability to make fine distinctions in sensory information for perception.
 - ☐ Form & Space Perception
 - ☐ Auditory Language Perception

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Postural Functions

- The subtle, spontaneous body adjustments that support overt movements such as reaching for a distant object. Postural adjustments depend upon integration of visual, vestibular and proprioceptive inputs.

- Mild Hypotonia
- Poor bilateral control & sequencing

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Praxis (Motor Planning)

- The ability of the brain to conceive of, organize, and carry out a sequence of unfamiliar motor actions.

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Disorders of Praxis

- Integration of motor, postural and sensory sensory discrimination is necessary for ideation, planning and execution of skill and fine tuning actions.
 - Somatodyspraxia
 - Poor praxis on verbal command
 - Visuopraxis, visuomotor, form & space, visual construction

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Etiology

- Unknown
- Higher incidence in children with developmental disabilities
- Deprivation
- Early stress

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Prevalence of Sensory Processing Disorders

- Typical population 5 – 10 %
- Developmental Disabilities 20 – 80%

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Relationship to Developmental Disorders

- SI not specific or universal to any one disorder
- Differentiating SI from other disorder
 - Pervasive Developmental Disorders
 - Attention Deficit Disorders
 - Regulatory Disorders
 - Post-institutionalized childre

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Attention Deficit Disorder

- Inattention
 - Poor attention to details
 - Difficulty sustaining attention to tasks
 - Distractible
 - Forgetful/absentminded
- Hyperactivity/Impulsivity
 - Fidgets
 - Can't sit still; on the go
 - Can't wait his turn; interrupts others

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Regulatory Disorders

- Hypersensitive Type
- Underreactive type
- Motorically disorganized , impulsive

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Pervasive Developmental Disorders

- Autism
 - Primary Triad of Symptoms:
Communication/Language, Social Interaction,
Repetitive Behaviors
- Fragile X
 - As many as 50% have autism
 - Sensory over- responsiveness and processing disorders a primary feature
- Asperger's & NVLD

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Research on Mechanisms

- Increase in reactivity
 - Physiological Measures
 - Behavioral Measures
- Poor Habituation
- Decreased vagal tone

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Sensory Challenge - Miller et al.

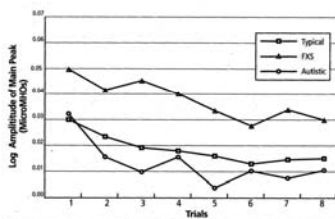


Figure 4.6. Electrodermal reactivity results for children developing Typically compared to children with Fragile X syndrome and children with Autistic Disorder

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Evaluation of Sensory Integration

- Clinical Observations
- Sensory History Checklists and Interviews
- Assessments of Sensory Integration

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Sensory History Checklists and Interviews

- **Sensory Profiles** (Dunn et al, 1999, 2001)
- **Short Sensory Profile** (McIntosh, Miller, Shyu, & Dunn, W., 1999a).
- **Evaluation of Sensory Processing** (Parham, et al., 2003)
- **Sensory Processing Interview and Inventory** (Wilbarger, et al.)
- **Sensory Rating Scale for Infants & Young Children** (Provost & Oetter, 1993)

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Assessments

- Sensory Integration and Praxis Test (Ayres,)
- Miller Assessment for Preschoolers & First Step (Miller,)
- Degangi-Burke Test of Sensory Integration
- Test of Sensory Functions In Infants (Degangi & Greenspan,)

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Disruptions of Sensory Modulation

- Sensation Seeking
- Sensation Avoidance
- Arousal and State Regulation
- Activity Level
- Organization (behavioral)
- Self Regulation

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Disruptions in Postural Control and Praxis

- Decreased muscle tone
- Delay in motor milestones
- Delay in hand use and fine motor skills
- Delay or poorly executed self-care skills

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Key Postulates of Change

- Sensory integration is necessary for development, adaptation and function
- Experience changes the structure, function and organization of the brain
 - Enhanced sensation
 - Adaptive Response
 - Intrinsic Motivation
 - Just Right Challenge

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Use of Enhanced Sensation

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Vestibular Input

- Sensory information from the vestibular receptors in our inner ear which informs the brain about head position, movement and gravity. This type of information influences balance, muscle tone, and bilateral coordination.

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Proprioceptive Input

- Sensory information from the muscles and joints which informs the brain about position of body parts and amount of force being exerted. This type of information influences body awareness and judgment regarding force to be used by the body.

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Tactile Input

- Sensory information from the skin which tells the brain about light touch. This type of information is used in many protective responses, early reflexes, and to provide feedback from actions.

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Adaptive Response

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Sensory Diet

- "The 'sensory diet' concept is based on the idea that each person requires a certain amount of activity and sensation to be the most adaptable and organized."
(Wilbarger & Wilbarger, 1991)
- Sensory activities incorporated into daily routines

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Specific Scheduled Activities

- Sensory activities must be repeated to have the most impact
- Must fit the family routine
- Promote adaptation

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Sensation in Sensory Diet Activities

- *Movement*
- *Proprioception*
- *Heavy work*
- *Deep Pressure touch*
- *Oral motor input*
- *Neutral Warmth*

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Adaptations and Changes in Routines

- Develop consistent routines for daily activities.
- Increase predictability of schedule and routines.
- Prepare for upcoming events or transitions.

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Accommodation of Interactions

- Voice
- Light Touch/ Tickle
- Scents
- Eye contact
- Moving and picking up
- Predictability

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Adaptation to the Environment

- Create safe play areas
- Provide safe sensory areas
- Reduce sensation

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Continuing Issues

- Defining Sensory Integrative Disorders
- Relationship to Other Disorders
- Efficacy of Sensory Integration Treatment

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Defining Sensory Integrative Disorders

- Consistent behaviors associated with SI dysfunction
- What are the significant clusters of behaviors? (Factors, syndromes, disorders etc.)
 - What are they? How do we define them?

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Relationship to Other Disorders

- Developmental Coordination Disorder
- ADHD
- Regulatory Disorders
- Fragile X & Autism

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Efficacy of Sensory Integration Treatment

- Characteristics treatment
- Populations
- Outcome measures

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